CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

Monthly Report
June 2009

August 25, 2009
CSOMonthly2009-06.doc

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements. See Attachment A for a summary of the precipitation volumes.

Table 1 – Flow-Frequency-Duration

	Location	CSO#	Freq.	Date of Event[1]	Estimated[2] Total Flow (Gallons)	Event Duration (Minutes)	Comments
1.	AL Parkway Storage (West)	2	None				
2.	NW Blvd @ Kiernan	6	4	Total	307,124	200	
				6/8	93,168	80	
				6/15	36,174	25	
				6/17	91,163	50	
				6/19	86,619	45	
3.	Columbia @ Downriver	7	3	Total	179,175	95	Missing data 6/1 02:30 to 6/1 08:20 Missing data 6/9 19:05 to 6/15 10:05
				6/8	3,143	15	
				6/17	6,778	20	
				6/19	169,254	60	
4.	Nettleton @ York/Buckeye	10	2	Total	40,653	100	Missing data 6/1 08:35 to 6/1 08:40
				6/8	3,112	70	
				6/19	37,541	30	
5.	Nora @ Pettet	12	3	Total	347,815	340	Missing data 6/1 08:45 to 6/1 08:50
				6/8	91,895	120	
				6/17	105,356	130	
				6/19	150,564	90	
6.	Sherwood @ Summit	14	3	Total	4,430	360	Missing data 6/1 08:50 to 6/1 08:55 Missing data 6/30 13:35 to 6/30 14:20 Missing data 6/30 15:25 to 6/30 20:25
				6/8	726	90	
				6/17	1,368	95	
				6/19	2,336	175	

[1] Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be "background noise" from the electronic equipment are not included in the table.

[2] The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

	Location	CSO#	Freq.	Date of Event[1]	Estimated[2] Total Flow (Gallons)	Event Duration (Minutes)	Comments
7.	Nettleton @ Ohio	15	3	Total	73,075	205	Missing data 6/30 14:40 to 6/30 15:25
				6/8	404	10	
				6/17	35,841	95	
				6/19	36,830	100	
8.	A @ Linton	16B	None				
9.	7th @ Inland Empire	19	None				Missing data 6/24 10:40 to 6/24 13:40
10.	3500 High Drive	20	1	Total	130,000	30	Gallons are an estimate. DOE letter sent on 7/3.
				6/20	130,000	30	
11.	Main @ Oak	22B	None				Missing data 6/1 09:40 to 6/1 09:45 Missing data 6/29 09:35 to 7/14 15:35
12.	Cedar @ Ide	23	3	Total	66,846	165	Missing data 6/1 09:05 to 6/1 09:10
				6/8	34,634	85	
				6/17	611	10	
				6/19	31,601	70	
13.	Riverside @ Cedar	24A	4	Total	1,531,850	360	Missing data 6/1 09:55 to 6/1 10:00
				6/8	56,624	75	
				6/15	832,387	125	
				6/17	182,794	125	
				6/19	460,045	35	
14.	Riverside @ Cedar	24B	2	Total	102,628	100	Missing data 6/1 10:25 to 6/1 10:30
				6/17	921	25	
				6/19	101,707	75	
15.	Cedar @ Main	25	3	Total	291,513	170	Missing data 6/1 09:25 to 6/1 09:30
				6/8	82,424	75	
				6/17	58,505	50	
				6/19	150,584	45	
16.	Riverside @ Lincoln	26	4	Total	3,546,024	395	Missing data 6/1 09:10 to 6/1 09:15 Missing data 6/3 09:40 to 6/3 10:40
				6/8	630,455	105	
				6/15	565,980	85	
				6/17	643,381	65	
				6/19	1,706,208	140	
17.	Arthur @ 5th	33A	4	Total	25,621	170	Missing data 6/8 09:15 to 6/8 09:20
				6/8	719	35	
				6/15	2,832	30	
				6/17	8,001	45	
				6/19	14,069	60	

	Location	CSO#	Freq.	Date of Event[1]	Estimated[2] Total Flow (Gallons)	Event Duration (Minutes)	Comments
18.	Perry @ 3rd	33B	4	Total	7,186,577	190	
				6/8	188,875	35	
				6/15	2,653,159	60	
				6/17	869,004	35	
				6/19	3,475,539	60	
19.	Arthur @ 3rd	33C	4	Total	3,133	90	Missing data 6/8 09:10 to 6/8 09:15
				6/8	131	20	
				6/15	210	10	
				6/17	1,006	15	
				6/19	1,786	45	
20.	Arthur @ 1st	33D	5	Total	65,775	300	Missing data 6/8 09:20 to 6/8 09:25
				6/8	13,040	85	
				6/12	2,259	15	
				6/15	1,933	20	
				6/17	16,218	60	
				6/19	32,325	120	
21.	Riverside @ Napa/Crestline	34	4	Total	4,118,704	410	Missing data 6/8 08:50 to 6/8 09:00
				6/8	488,377	90	
				6/15	952,816	85	
				6/17	1,228,640	110	
				6/19	1,448,871	125	
22.	S. Riverton @ Magnolia	38	4	Total	18,909	295	
				6/8	185	60	
				6/12	1,668	55	
				6/17	1,882	85	
				6/19	15,174	95	
23.	S. Riverton @ Altamont	39	2	Total	5,719	35	
				6/17	626	15	
				6/19	5,093	20	
24.	S. Riverton @ Regal	40	2	Total	9,445	100	
				6/17	2,690	45	
				6/19	6,755	55	
25.	Rebecca @ Upriver	41	3	Total	73,900	170	
				6/8	1,363	45	
				6/17	16,636	55	
				6/19	55,901	70	
26.	Riverton @ Surro	42	None				
	Monthly Total		**67**		**18,128,916**	**4,280**	**No Dry Weather Overflows**

Table 2 – Rainfall Summary[3]

Date	1004 Rain	343 Rain	344 Rain	Shadle Rain	Hartson Rain	CityHall Rain	Joe_Albi Rain	RkwdVsta Rain	Station8 Rain	W_Drive Rain	Nora&Pet Rain	GEG Rain	GEG Snow	GEG Dpth	NWS Rain	NWS Snow	NWS Dpth
06/01/09	0	0	0	0	0	0	0	0	0	0	**0P**	0	0	0	0	0	0
06/02/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/03/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/04/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/05/09	0	0.04	0.02	0	0.09	0	0	0.02	0.04	0	0	T	0	0	0	0	0
06/06/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/07/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0
06/08/09	0.07	0.24	0.1	0.25	0.29	0.26	0.33	0.32	0.37	0.26	0.31	0.09	0	0	0.1	0	0
06/09/09	0	**0P**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/10/09	0	**0M**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/11/09	0	**0M**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/12/09	0.06	**0M**	0	0	0.12	0	0	0	0	0.01	0	0.01	0	0	0.5	0	0
06/13/09	0	**0M**	0	0	0.01	0	0	0	0	0	0	0	0	0	T	0	0
06/14/09	0	**0M**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/15/09	0.27	**0M**	0.18	0.11	0.31	0.04	0.01	0.43	0	0.43	0.07	0.24	0	0	0.23	0	0
06/16/09	0	**0.01P**	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0
06/17/09	**0.14P**	0.27	0.24	0.2	0.59	0.25	0.18	0	0.45	0.31	0.25	0.18	0	0	0.21	0	0
06/18/09	0	0.01	0	0	0.01	0	0.01	0	0	0	0.01	0	0	0	0	0	0
06/19/09	0.54	0.55	0.38	0.51	0.51	0.36	0.75	0	0.74	0.64	0.47	0.55	0	0	0.68	0	0
06/20/09	0.02	0	0	0	0.01	0.01	0.01	0	0	0	0.01	0	0	0	0	0	0
06/21/09	0.1	0.12	0.06	0.08	0.11	0.09	0.09	0	0.27	0.15	0.08	0.11	0	0	0.11	0	0
06/22/09	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0
06/23/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/24/09	0	0	0	0	0	0	0	0	0	0	0	T	0	0	T	0	0
06/25/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/26/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/27/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/28/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/29/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/30/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1.21**	**1.24**	**0.98**	**1.15**	**2.06**	**1.01**	**1.38**	**0.77**	**1.87**	**1.8**	**1.2**	**1.18**	**0.0**		**1.83**	**0.0**	

E - Erroneous data
M - Missing data
P - Partial missing data
T - Trace of rain/snow
X - Out of Service

Table 3 – Rain Gauges

1004	Airway Heights
343	23rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
GEG	Spokane Airport
NWS	National Weather Service – Spokane

[3] **Some rain gauges are heated. Consequently they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.**